

TITLE OF THE INVENTION

COMPOSITE GOLF CLUB ASSEMBLY TECHNIQUE

BACKGROUND OF THE INVENTION

5 This invention relates to golf club head assembly from
component parts. The desirability of assembling a golf club head
from pre-cast or pre-machined components to save weight and cost
is limited by the methods of assembly. This invention addresses the
problems associated with assembling golf club heads from several
parts constructed from different alloys of metal.

10 Other methods of golf club assembly have been put forward,
notably "Composite Golf Club Head", US Pat. No. 5,154,425 by
Niskanen et al., "Method of Manufacturing a Composite Golf Club
Head", US Pat. Appl. 2002/0049097 by Murphy et al., and "Multiple
Material Golf Club Head With Face Insert", US Appl. 2002/0142861

15 by Helmstetter et al. The technique embodied by the present
invention departs from all of these by using a step assembly

technique and novel attachment means to produce a club head that is strong and hard at the same time.

BRIEF SUMMARY OF THE INVENTION

This invention is a method and means of assembling a hollow
5 golf club head from metal components using a novel attachment technique that avoids the problems of heat-treating the head. A typical composite golf club head made from titanium is composed of a body, a face-plate, and a sole plate. The titanium body is first cast, then assembled, then a machined face plate and sole plate are
10 attached via inert-gas welding. The resulting composite head is then heat-treated to increase the strength of the materials.

In a pure titanium golf club head assembled from components, the metal of the club head is a different alloy than that of the face and sole plates. The face and sole plate require heating to a higher
15 temperature than the metal of the club head itself to achieve the best club performance.

Annealing the face and sole plates, by raising them to an appropriate temperature, in a pre-assembled head requires that the entire club head be raised to that temperature, since all the parts are present together. The titanium alloy of the welding material is
5 unable to withstand this temperature without the risk of cracking or deforming, so the optimum face-and-sole plate hardening temperature is never reached during manufacture.

The composite club head face and sole plates are therefore softer than needed for optimum performance. In a head pre-
10 assembled and then heat-treated. A new means of assembling the titanium components is required to achieve optimum club performance from a strong and tough club head and a thoroughly hardened sole and face plate.

This technique can also be applied to golf club heads
15 assembled from other light metals, such as magnesium.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1. Is an exploded diagram of a composite golf club head.

Figure 2. Is a diagram of the face and sole plate assembly

DETAILED DESCRIPTION OF THE INVENTION

Referring to Fig. 1 and Fig. 2, a typical club head¹⁰⁰ design is shown. The composite club head is composed of a club head body containing a hosel¹⁰¹, head body top¹⁰², head body bottom¹⁰³,
5 and a sole¹⁰⁷. There is a separate face and sole plate assembly comprised of a face plate¹⁰⁴ and a sole plate¹⁰⁵.

Traditionally, the method of assembling these parts has been to weld them with titanium alloy to make a single piece. The single piece is then heat treated to harden the face¹⁰⁴ and sole plates¹⁰⁵.

10 In this preferred embodiment of the invention, the sole plate¹⁰⁵ and face plate¹⁰⁴ are cast together in one piece. The two plates can be cast separately and attached separately to the club head assembly.

This invention is a method of assembling the components of
15 the club head¹⁰⁰ to permit separate heat treatment of the face¹⁰⁴ and sole plates¹⁰⁵ before assembly while constructing a solid,

strong club head. The new method relies on adhesive film or an epoxy glue to assemble the parts. In alternate embodiments, a system of mechanical interlocks or electron beam welding can be used to assemble the golf club head.

- 5 The parts are separately cast or machined. In the preferred embodiment, the all-titanium golf club head, the club head body parts^{101,102,103} are cast from a different titanium alloy than the face plate¹⁰⁴ and sole plate¹⁰⁵, the face¹⁰⁴ and sole plates¹⁰⁵ are hardened by heat treatment at a higher temperature than the other
- 10 components, and all of the components are then assembled together using the attachment means by applying it at points ¹⁰⁶ and ¹⁰⁷, and then the entire structure is heat-treated to a temperature of only 300 degrees Fahrenheit. This temperature is sufficient to cure the adhesive but does not threaten to crack the titanium body parts.
- 15 The resulting structure is light, strong, and possesses a hard face and sole plate. The advantages are that 1) the integrity and

quality of the components can be controlled and cracks and breaks minimized, 2) the connection between the components is superstrong compared to titanium welding, and 3) the result is metallurgically sound -- the strong parts are strong, the hard parts are hard, and the components can be assembled using any mechanical means, including screwing them together. In the preferred embodiment, the parts are glued with the aforementioned adhesive film.

While the preferred embodiment of the invention has been described, modifications can be made and other embodiments of this invention realized without departing from the intent and scope of any claims associated with this invention.